Dr. Markus Völter (Voelter)

Born February 14, 1974, in Heidenheim/Brenz, Germany
Degrees Dipl. Ing. (FH) Physikalische Technik (Physics Engineering)
PhD in Computer Science

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Markus works works as an independent researcher, consultant and coach for language engineering, domain specific languages, model-driven software development, product lines and software architecture. He helps bridge the gap from industry and business domains to software systems: he analyses domains, design user-friendly languages and supporting analyses, and implements language tools and IDEs, and architects efficient and reliable backends based on interpreters and generators. He also work on formalisms and meta-tools for language engineering.

For 20 years, Markus has consulted, coached and developed in a wide range of industries, including finance, automotive, health, science and IT. He has written several books on the subject and spoken at many industry conferences world-wide. An important aspect of Markus' work is to keep one foot in academia by publishing papers in peer-reviewed conferences and journals and through participation in academic conferences and workshops. Markus has a diploma in technical physics from FH Ravensburg-Weingarten and a PhD in computer science from TU Delft. He is a member of the ACM, Hillside Europe and the IFIP WG 2.16 on Programming Language Design.

A more detailed version of this CV with all projects, and publications is at:
http://voelter.de/data/cv/cv.pdf

A list of every publication and talk, including PDFs and slides, is at:
http://voelter.de

Core Skills

Technical. Recognized expert on language engineering, domain-specific languages and model-driven software development. I also have a good and broad overview of software engineering, from years of experience in different fields, from recording more than 120 SE Radio podcasts, and from participating in many industry and academic conferences. I like to work on the conceptual level (with academia) and on the applied level (in industry).

Innovative. Pioneered several techniques in industry: Eclipse-based business applications; generative component infrastructures (which led to building the AUTOSAR proof of concept for BMW); GMF-style generation of graphical editors (when there was only GEF); model-driven development and textual DSLs (when UML was mainstream); and using projectional editing for modular languages and mixing DSLs and GPLs (MPS/mbeddr).

Leadership. Very good at motivating others about topics I am enthusiastic about. Good at understanding the various positions in a team, reflect them, make a decision and then communicate the result.

Communication. Very good skills in written and spoken English (see books and papers) especially wrt. technical topics. I can explain complex topics in a structured way (a skill obtained partially from hundreds of interviews in podcasts and from conference talks). I can understand and recap customer requirements. I like to apply these skills in the context of technical PR and technical marketing. I love public speaking, and I am known to be a competent, engaging and entertaining presenter. I have done over 200 talks, tutorials and keynotes at conferences and recorded and published over 300 podcast episodes (ca. 130 about software, the rest about other topics in science and engineering).

Technical Expertise

Language Design. 12+ years of designing mixed-notation domain-specific languages based on requirements of the domain in which it will be used; wide variety of domains, from embedded software, automotive and space to business, financial and government systems.

Language Implementation. 12+ years of Implementation of language structure, syntax, type systems, interpreters, transformations and IDEs based on Jetbrains MPS and Eclipse Xtext.

Software Architecture. 15+ years of experience in designing, architecting and implementing large-scale software systems in enterprise, embedded and scientific contexts (lists see below).

Formal methods. 4 years of integrating formal methods (SMT solving, model checking and data flow analysis) with DSLs in the context of MPS.

Management and Leadership

Except for my 2-year stint at the **Mathema Ulm** office, I have never acted as a line manager. However, I have successfully led many development projects and teams. The most relevant examples are also the most recent:

Between 2011 and 2014 I acted as **the principal investigator for the mbeddr project**. Together with Bernd Kolb, I led the development team through the milestones: my original idea, a successful research grant, a successful conclusion of the project, mbeddr a successful open source project and its use in various industry projects.

Between 2013 and 2014 I was **leading the 8 person itemis/fortiss team** that developed the ESD tool for Siemens PLM on top of mbeddr. My responsibilities included architectural guidance, feature negotiations with the customer and management of the day-to-day activities of the developers.

Since 2015 my role is essentially **programme manager**: I guide several teams and projects around language engineering and MPS. These include the evolution of mbeddr, development of Siemens ESD, a DSL project in the insurance industry plus a number of smaller MPS-based projects. It also includes working with the MPS team at JetBrains to improve the state of the art in language engineering and the MPS tool itself.

In 2017 I started co-managing a project to develop a **web-based projectional language workbench** that involves 7 other engineers at itemis.

Selected Project and Roles

Since 2008 my main focus has been the **strategic and technical leadership of the MPS team** at itemis; grown to 16 people running DSL projects in domains such as automotive, aerospace, medicine and finance & insurance.

2019 Integration of DSLs with **formal methods** for ClosedLoopMedicine.

2018 Design and development of two different DSLs for two departments of DATEV, both for **calculation of taxes**.

2017 Development of a reusable and embeddable **functional language** KernelF.

2017 Consolidation and documentation of **formal methods** activities. Co-leading a project to develop a **web-based projectional language workbench** at itemis.

2016 Architecture and design of a DSL for **medical algorithm specification** for Voluntis – will substantially speed up development, test and certification of software medical devices.

Architecture and design of a DSL for **cloud applications** for Workday to revamp their customization experience for consultants and end users.

2015 Consulting for Prosoz on a DSL-based approach for describing their business logic independent from the implementation technology to substantially increase app development speed in the **social insurance domain.**

2014 Supporting i2s in Portugal with a DSL for describing **insurance products** to increase the efficiency of insurance product definition.

Consulting for the Dutch Tax Agency in a project to reimplement and evolve **their tax rule definition language.**

Design and implementation of a prototype DSL for product configuration of **industrial engine controllers** for Dynagen Technlogies to increase the speed and flexibility of product configuration.

2013 Consulting for Rohde&Schwarz SIT on a project for **next-gen network crypto device**; helped with requirements engineering and the DSL-based development process.

2007 As a senior independent consultant for Intentional Software, helped design a DSL for **insurance product specification** for Achmea insurance in the Netherlands.

2005 Helped with architecting T-Mobile's next generation model-driven **service-oriented middleware.**

2002 Consulting for European Southern Observatory's **ALMA telescope project**, on component architecture and development process.

Architecture and component model for Himalaya II (dvg, German Sparkassen-EDV), one of the **biggest J2EE projects worldwide** in the financial industry at the time.

Plus many **shorter term consulting projects** mainly around DSLs and their impact on business processes for companies like Audi, Apple, BMW, BOSCH, Daimler, Siemens, Peugeot, ZF, Contintental, Huawei.

Research and Publications

PhD with Eelco Visser at TU Delft: The thesis, called *Generic Tools, Specific Languages*, introduces the approach of capturing a domain's core in DSLs on top of a language workbench. The thesis relied on mbeddr, an extensible set of integrated languages for embedded software engineering built on top of Jetbrains MPS that was developed as part of a government-funded research project I co-ran as part of my work for itemis.

Grants. I have participated in several, and significantly contributed to two, research project proposals (as well as the projects' subsequent execution): The BMBF KMU-Innovativ project *Language Workbenches for Embedded Systems* (FKZ 01 IS 11014) and the BMBF KMU-Innovativ project *Integrated Specification Environments for Specifying Technical Systems* (FKZ 01 IS 15037).

Teaching and Supervision. Taught several full university courses on language engineering and model-driven software development. Many guest lectures at universities. Supervised several bachelor and masters theses, and one PhD thesis.

Publications: h-index 35, i10-index 76 (based on Google Scholar). Co-authored 6 journal papers (J-ASE, IEEE Software), 19 conference papers (OOPSLA, ASE, SLE, FSE), 19 workshop papers, and 15 pattern papers; all peer-reviewed. I have also published 75+ articles in German and international industry magazines.

Books. Co-authored 8 full books, including well-received books on Model-Driven Software Engineering (dPunkt 2005/2007 and Wiley 2006) as well as on DSL Engineering (CreateSpace, 2013). Two books as part of the Wiley pattern series.

Six Most Important Publications.

1. [Journal] M. Voelter, B. Kolb, K. Birken, F. Tomassetti, P. Alff, L. Wiart, A. Wortmann, A. Nordmann, *Using Language Workbenches and Domain-Specific Languages for Safety-critical Software Development*, International Journal on Software and Systems Modeling (SOSYM), -Online-, 25 pages, https://link.springer.com/article/10.1007/s10270-018-0679-0, 2018
2. [Book] M. Voelter, T. Stahl. *Model-Driven Software Development – Technology, Engineering, Management*. Updated translation of the German MDSD book, Wiley, 2006
3. [Book] M. Voelter et al. *DSL Engineering - Designing, Implementing and Using Domain-Specific Languages*. CreateSpace Publishing (self-published), *dslbook.org*, 2013
4. [Conference] M. Voelter, A. van Deursen, B. Kolb, S. Eberle. *Using C Language Extensions for Developing Embedded Software: A Case Study*. OOPSLA 2015, 20 pages, 2015

5. [Journal] M. Voelter, B. Kolb, T. Szabo, D. Ratiu, A. van Deursen. Lessons learned from building mbeddr – a case study in language engineering. International Journal on Software and Systems Modeling (SOSYM), January 2017, 46 pages, http://rdcu.be/oo3W, 2017; http://rdcu.be/oo3W, 2017; selected as one of the best SOSYM papers of the year, and presented at MODELS 2017
6. [Conference Paper] Z. Molotnikov, M. Voelter, D. Ratiu. *Automated Domain-Specific C Verification with mbeddr*. ASE 2014, 20 pages, 2014

Teaching

Full Courses. Uni Stuttgart 2015 & 2016 (Prof. S. Wagner), Uni Nantes 2010 (Prof. J. Bezivin), Uni Leipzig 2006 (Prof. U. Eisenecker), FH Ulm 2002 & 2003 (Prof. S. Wagner).

Guest Lectures. Over 20 guest lectures at universities throughout Europe.

Student Supervision: Tamas Szabo PhD Thesis on Incremental Program Analysis, TU Darmstadt/Delft/Mainz, ongoing, Four more, with Uni Stuttgart, TU Darmstadt, HS Reutlingen, HdM Stuttgart

Public Speaking

Keynotes. I have delivered keynotes at over 10 academic and industrial events, including SPLC 2018, ICMT 2018, ITSLE 2016, the DSLRob and Modevva Workshops, ECSA, JAX London and CodeGeneration.

Invited Talks. I have been personally invited to give talks at 15+ international events including SPLASH-I, Curry-On, the IFIP WG 2.16, ECSEE, ICALEPCS and at CERN. I have also participated (and delivered talks at) several Dagstuhl and Leibnitz Center seminars and summer schools.

Conference Talks and Tutorials. I (co-)presented over 200 talks and tutorials at national and international conferences, including OOP, JAX, EclipseCon, Öredev, JAOO, ECOOP, MODELS, OOPSLA/SPLASH, ECMDA, AOSD, GPCE, TOOLS, ICSE, QCon, SPLC, SE, Embedded Software Kongress, CodeGeneration.

Community Activities and Memberships

Co-Initiator of the Language Workbench Challenge. Reviewer for Journal of Software and Systems Modeling (SoSyM), Reviewer for IEEE Software, IEEE Software SI on Software Patterns Guest Editor, Ex-IEEE Software Industry Advisory Board member. Program/Track chair at several international conferences.

Member of IFIP Working Group 2.16 on Programming Language Design, ACM and Hillside Europe.

Podcasting

Podcasting is a wonderful educational vehicle: the dialog between two people, one asking intelligent questions, and the other one explaining expertly, is vastly underrated as a means of explaining complex topics.

In 2006 I founded Software Engineering Radio (http://se-radio.net), one of the premier podcasts on software engineering. Some episodes have up to 50,000 downloads. Of the 180 episodes available at the time SE Radio was handed over to IEEE, I had acted as the interviewer for ca. 120. In addition to being an educational resource for the listener™s, it has also helped me better understand many aspects of software engineering. In 2012 I handed SE Radio over to IEEE Software, because the current editing and interviewing team was running out of steam.

In 2008 I founded the omega tau podcast (http://omegataupodcast.net) which covers a wide range of topics from science and engineering. I had to give up SE Radio to be able to focus on omega tau. Together with my partner Nora Ludewig, we have since published over 320 episodes on topics such as particle physics, astronomy, biochemistry, space and aviation.